

BED REST IS AN ANALOG TO STUDY THE PHYSIOLOGICAL CHANGES OF SPACEFLIGHT AND TO EVALUATE COUNTERMEASURES

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OBJECTIVES/SPECIFIC AIMS: The UTMB/NASA Flight Analog Research Unit is an inpatient unit with a bionutritiuon kitchen and unique testing areas for studying subjects subjected to 6 degree head-down complete bed rest for prolonged periods as an analog for zero gravity. Bed rest allows study of physiological changes and performance of functional tasks representative of critical interplanetary mission operations and measures of the efficacy of countermeasures designed to protect against the resulting deleterious effects. **METHODS/STUDY POPULATION:** Subjects are healthy adults 24-55 years old; 60 – 75 in tall; body mass index 18.5-30; and bone mineral density normal by DXA scan. Over 100 subjects have been studied in 7 campaigns since 2004. The iRAT countermeasure combines high intensity interval aerobic exercises on alternating days with continuous aerobic exercise. Resistance exercise is performed 3 days per week. Subjects are tested on an integrated suite of functional and interdisciplinary physiological tests before and after 70 days of total bed rest. **RESULTS/ANTICIPATED RESULTS:** It is anticipated that post-bed rest functional performance will be predicted by a weighted combination of sensorimotor, cardiovascular and muscle physiological factors. Control subjects who do not participate in the exercise countermeasure will have significantly greater decreases in these parameters. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Astronauts experience alterations in multiple physiological systems due to exposure to the microgravity, leading to disruption in the ability to perform functional tasks after reintroduction to a gravitational environment. Current flight exercise countermeasures are not fully protective of cardiovascular, muscle and bone health. There is a need to refine and optimize countermeasures to mitigate health risks associated with long-term space missions.